WEST

Generate Collection Print

102

L2: Entry 49 of 53 File: DWPI Oct 24, 2000

DERWENT-ACC-NO: 2000-637989
DERWENT-WEEK: 200061

TITLE: Double-sided scrubbing of semiconductor wafer prior to photolithographic processing removes particulate contaminants from the back side of the wafer

INVENTOR: EARLY, K R; LA, T L ; RAMSBEY, M T ; THOMAS, J F ; VENKATKRISHNAN, S N

PATENT-ASSIGNEE: ADVANCED MICRO DEVICES INC (ADMI)

PRIORITY-DATA: 1997US-0800940 (February 13, 1997)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
US 6136510 A	October 24, 2000		007	G03F007/00

APPLICATION-DATA:

PUB-NO	APPL-DATE	APPL-NO	DESCRIPTOR
US 6136510A	February 13, 1997	1997US-0800940	

INT-CL (IPC): G03 F 7/00

ABSTRACTED-PUB-NO: US 6136510A
BASIC-ABSTRACT:

NOVELTY - Double-sided scrubbing of the wafer is performed before forming dielectric layers on the front side of the wafer and after forming an opening by photolithographic processing of each dielectric layer. Scrubbing removes particulate contaminants from the back side of the wafer and thereby improves the accuracy of the photolithographic techniques.

DETAILED DESCRIPTION - Removal of back side particulates produces a wafer flatness where the maximum distance between a high and low region within the stepper field used during the photolithographic technique is no greater than the maximum feature size within the stepper field.

An INDEPENDENT CLAIM is given for manufacturing a semiconductor device.

USE - Production of high speed integrated circuits, particularly semiconductor devices having submicron design features such as transistors, contacts, vias and conductive lines.

ADVANTAGE - Reduced photolithographic failure.

ABSTRACTED-PUB-NO: US 6136510A
EQUIVALENT-ABSTRACTS:

CHOSEN-DRAWING: Dwg.0/1

DERWENT-CLASS: G06 L03 P84 U11
CPI-CODES: G06-A13; G06-D06; G06-E; G06-E04; L04-C09; L04-C26;
EPI-CODES: U11-C04A1A; U11-C04E1; U11-C07D4;

WEST

Generate Collection Print

CVD

col 3 - heat transf, He

L19: Entry 17 of 27 File: USPT

(clean up) col 13 sub. place

DOCUMENT-IDENTIFIER: US 6136725 A
TITLE: Method for chemical vapor deposition of a material on a substrate

col 23, l 17-35 Fig 15

Detailed Description Text (97):
The operation of a cluster tool 120 commences with wafers being loaded into an input cassette 136 in an entrance load lock 126. A robot arm 134 (available from Brooks Automation) in the transport module 122 removes one wafer at a time from the input cassette 136 and moves each wafer to an alignment station 138. At the alignment station 138, a standard notch in each wafer is precisely aligned before further processing, eliminating wafer orientation effects within a process module and aiding in process uniformity. Once aligned, the robot arm 134 moves the wafer to a preheat module 130 where the wafer remains for approximately 30 seconds while being heated to 300-500.degree. C. When a CVD apparatus 10 becomes available, the wafer is moved to the process chamber of that CVD apparatus 10 for tantalum oxide deposition. Deposition occurs over a period of approximately 120 seconds. After deposition, the wafer is moved to the cool module 132, where the wafer resides for 30 seconds and is cooled enough to place it in the output cassette 140 in the exit load lock 128.

cl 16
load lock → clean module → backside → aligner → ~~process~~ align in the aligner

cl 17
load lock → clean module → backside → align in the clean module

cl 18
clean module → load lock – align

WEST

Generate Collection | Print

L17: Entry 12 of 28 File: USPT

DOCUMENT-IDENTIFIER: US 6251759 B1
TITLE: Method and apparatus for depositing material upon a semiconductor wafer using a transition chamber of a multiple chamber semiconductor wafer processing system

Detailed Description Text (6):
FIG. 1 depicts a cluster tool 100 similar to an Endura System, but having a transition chamber that is configured in accordance with the present invention. The tool 100 is comprised of a metallization cluster 102 and a pre-metallization cluster 112. The metallization cluster 102 consists of four process chambers 104, 106, 108 and 110 wherein wafers are processed, such as by CVD copper deposition. The pre-metallization cluster 112 consists of two load lock chambers 114 which admit and withdraw wafers from the system, a wafer orientation/degas chamber 116 and, in the configuration shown, a preclean chamber 118 for sputter cleaning the wafer, and a barrier layer deposition chamber 121. The metallization cluster 102 and the pre-metallization cluster 112 each contain robotic wafer handling mechanisms 119 and 120 that transport the wafers amongst the chambers within their respective clusters.

dry clean
align.
clean
transport
Chuck
Plasma

He

WEST

Generate Collection Print

?

L20: Entry 4 of 12 File: USPT prior?

DOCUMENT-IDENTIFIER: US 6312525 B1
TITLE: Modular architecture for semiconductor wafer fabrication equipment

Brief Summary Text (5):
A cluster tool is typically operated as follows. The transfer chamber is brought to a vacuum by an integrated pumping system. Each of the process chambers are isolated from the transfer chamber by an isolation valve which allows the process chambers to operate at a different level of vacuum than the transfer chamber and prevents any gasses being used in the process chamber from being introduced into the transfer chamber. The load lock chambers are also isolated from the transfer chamber with isolation valves. Each load lock chamber has a door which opens to the outside environment. In normal operation, a cassette loaded with wafers is placed into a load lock chamber through the door and the door is closed. The load lock chamber is then evacuated to the same pressure as the transfer chamber and the isolation valve between the load lock chamber and transfer chamber is opened. The robot in the transfer chamber is moved into position and one wafer is removed from the load lock chamber. The load lock chamber is preferably equipped with an elevator mechanism so as one wafer is removed from the cassette, the elevator moves the stack of wafers in the cassette to position another wafer in the transfer plane so that it can be positioned on the robot blade. The robot in the transfer chamber then rotates with the wafer so that the wafer is aligned with a process chamber position. The process chamber is flushed of any toxic gasses, brought to the same pressure level as the transfer chamber, and the isolation valve is opened. The robot then moves the wafer into the process chamber where it is lifted off the robot. The robot is then retracted from the process chamber and the isolation valve is closed. The process chamber then goes through a series of operations to execute a specified process on the wafer. When complete, the process chamber is brought back to the same environment as the transfer chamber and the isolation valve is opened. The robot removes the wafer from the process chamber and then either moves it to another process chamber for another operation or replaces it in a load lock chamber to be removed from the system when the entire cassette of wafers has been processed.

Brief Summary Text (6):
To improve the productivity of the cluster tools, some wafer manufacturers have automated the loading and unloading of the load lock chambers by including systems that can take a cassette of wafers from a passing vehicle and load it into an open load lock chamber. Similarly, these systems can remove a processed cassette of wafers and place them on a vehicle to be taken to other tools for further processing.

Brief Summary Text (13):
The above-described deficiencies may be remedied by defining and implementing a modular architecture for cluster tools. In such an architecture, each portion or module of the tool has a clearly defined set of functions that it is to perform and a specifically defined interface between itself and other modules with which it may interact. In one embodiment, a cluster tool includes a central cluster module, one or more load lock modules, a set of process chamber modules and, preferably, a factory interface module. Each of these modules includes a set of functions that it is intended to perform. The central cluster module would be responsible for providing an environment that is compatible with the process chamber modules, providing an appropriate isolation valve between each process chamber module and the central cluster, delivering wafers to each process chamber module, removing wafers

from the process chamber modules, providing any gasses, liquids, or other services that may be required by the process chamber modules, and interacting with the load lock modules to provide a continuous flow of wafers to the process chamber modules. The load lock modules are responsible for accepting wafers from a human operator, some type of automated wafer handling system, or the factory interface module and changing the environment in which the wafers reside so that it is compatible with the central cluster module. The module is also responsible for manipulating, i.e. indexing, the wafers so that the robot in the central cluster module may remove and replace wafers from the load lock module. The factory interface module, if used, would be responsible for receiving cassettes or enclosed pods of wafers from either a human operator or an automated wafer handling system, opening the pod, and moving the wafers to and from the load lock modules. The process chamber modules are responsible for receiving wafers from the central cluster module, processing the wafers, and allowing the wafers to be removed by the central cluster module.

WEST

Generate Collection Print

L17: Entry 10 of 28 File: USPT

DOCUMENT-IDENTIFIER: US 6312525 B1
TITLE: Modular architecture for semiconductor wafer fabrication equipment

Brief Summary Text (6):
To improve the productivity of the cluster tools, some wafer manufacturers have automated the loading and unloading of the load lock chambers by including systems that can take a cassette of wafers from a passing vehicle and load it into an open load lock chamber. Similarly, these systems can remove a processed cassette of wafers and place them on a vehicle to be taken to other tools for further processing.

Brief Summary Text (13):
The above-described deficiencies may be remedied by defining and implementing a modular architecture for cluster tools. In such an architecture, each portion or module of the tool has a clearly defined set of functions that it is to perform and a specifically defined interface between itself and other modules with which it may interact. In one embodiment, a cluster tool includes a central cluster module, one or more load lock modules, a set of process chamber modules and, preferably, a factory interface module. Each of these modules includes a set of functions that it is intended to perform. The central cluster module would be responsible for providing an environment that is compatible with the process chamber modules, providing an appropriate isolation valve between each process chamber module and the central cluster, delivering wafers to each process chamber module, removing wafers from the process chamber modules, providing any gasses, liquids, or other services that may be required by the process chamber modules, and interacting with the load lock modules to provide a continuous flow of wafers to the process chamber modules. The load lock modules are responsible for accepting wafers from a human operator, some type of automated wafer handling system, or the factory interface module and changing the environment in which the wafers reside so that it is compatible with the central cluster module. The module is also responsible for manipulating, i.e. indexing, the wafers so that the robot in the central cluster module may remove and replace wafers from the load lock module. The factory interface module, if used, would be responsible for receiving cassettes or enclosed pods of wafers from either a human operator or an automated wafer handling system, opening the pod, and moving the wafers to and from the load lock modules. The process chamber modules are responsible for receiving wafers from the central cluster module, processing the wafers, and allowing the wafers to be removed by the central cluster module.

WEST

Generate Collection Print

print

L17: Entry 9 of 28 File: USPT

DOCUMENT-IDENTIFIER: US 6372301 B1
TITLE: Method of improving adhesion of diffusion layers on fluorinated silicon dioxide

Detailed Description Text (2):
FIG. 1 is a schematic view of a cluster tool system having multiple substrate processing chambers. The cluster tool system 100 includes vacuum load-lock chambers 105 and 110 attached to a first stage transfer chamber 115. The load-lock chambers 105 and 110 maintain vacuum conditions within the first stage transfer chamber 115 while substrates enter and exit system 100. A first robot 120 transfers substrates between the load-lock chambers 105 and 110 and one or more substrate processing chambers 125 and 130 attached to the first stage transfer chamber 115. Processing chambers 125 and 130 can be outfitted to perform a number of substrate processing operations such as chemical vapor deposition (CVD), physical vapor deposition (PVD), etch, pre-clean, degas, orientation and other substrate processes. The first robot 120 also transfers substrates to/from one or more transfer chambers 135 disposed between the first stage transfer chamber 115 and a second stage transfer chamber 140.

WEST

Generate Collection Print

✓ 102

L2: Entry 22 of 53 File: USPT

DOCUMENT-IDENTIFIER: US 6080675 A
TITLE: Method for cleaning waste matter from the backside of a semiconductor wafer substrate

Brief Summary Text (7):
One problem with conventional fabrication processes is that removing the waste matter from the backside of a wafer reduces the throughput and increases the material costs of the finished microelectronic devices. In conventional fabrication processes, waste matter is removed from the backside of the wafer by: (1) depositing a sacrificial cover layer made from a resist material over the front side of the wafer to protect the circuitry on the front side from the etchants used to remove the waste matter; (2) etching the waste matter from the backside of the wafer using suitable etchants that remove the particular materials of the waste matter; and (3) removing all of the sacrificial resist layer from the front side of the wafer. Conventional waste matter removal methods require additional process steps and time because the sacrificial resist layer must be deposited over on the front side of the wafer and then completely removed from the wafer. This method wastes time and material because the sacrificial resist layer is a temporary layer formed on the wafer only for the purpose of removing material from the backside of the wafer. Since the sacrificial resist layer is not used for any other purpose, the time and materials used to form and remove the sacrificial resist layer are lost expenses once the backside of the wafer is clean. Thus, conventional methods for removing the waste matter from the backside of the wafer reduce the throughput and increase the material cost of manufacturing microelectronic devices.

NO

WEST

Generate Collection | Print

L7: Entry 6 of 11 File: USPT

DOCUMENT-IDENTIFIER: US 6152148 A
TITLE: Method for cleaning semiconductor wafers containing dielectric films

Detailed Description Text (18):
As indicated, the present cleaning method includes the step of frictionally or mechanically agitating the surface or semiconductor wafer having a low .kappa. dielectric film coated therein or thereon. By frictional or mechanical agitation of the semiconductor substrate surface is meant buffing, rubbing, brushing or sonically vibrating the surface of the semiconductor wafer. Particle removal is further enhanced by the addition of mechanical shear forces. Consequently mechanical brush scrubbing is now widely used as a means of post-CMP cleaning and is the preferred mechanical agitation application to effect semiconductor wafer cleaning in accordance with the instant invention. In practice the mechanical scrubbing occurs on both sides of the wafer (backside and surface) simultaneously and is thus referred to as double-sided brush scrubbing.

Current US Cross Reference Classification (2):
134/26

WEST

Generate Collection Print

L20: Entry 11 of 12 File: USPT

DOCUMENT-IDENTIFIER: US 5605866 A
TITLE: Clamp with wafer release for semiconductor wafer processing equipment

Brief Summary Text (5):
It is known that the mechanical movement of machine parts is responsible for generation of unwanted particles and, accordingly, the movement of various automated wafer transport and stationing mechanisms within wafer processing equipment is carefully controlled. Many types of wafer processing equipment are designed to process wafers individually, i.e., one at a time or serially, as opposed to batch processing. In such equipment, wafers are typically loaded in the processing system by a cassette and individually and automatically transferred from the cassette to one or more processing stations. A number of systems have recently been developed with a plurality of processing stations housed within a single vacuum environment. The stations may perform processing steps such as, for example, sputtering, chemical vapor deposition (CVD), plasma etching, heating, etc. These systems typically include one or more load-lock chambers where the wafers are introduced and removed from the vacuum environment. In so-called "cluster tool" systems, the wafers are typically transferred by means, such as robot arms, between the load-lock chamber and the process stations within the vacuum environment.

Detailed Description Text (16):
Push rods 82, operable for pushing against frame assembly 71, are used to translate structure 70 and attached clamp mechanism 30 up and down. (For purposes of this specification, when the clamp is in an up position it is considered to be retracted and when it is in a down position, i.e., in contact with the substrate to clamp it against platform 22, it is considered to be fully extended.) A base support 84 is attached to support means 20 and has an aperture 85 through which each rod 82 is operated, and a sleeve guide 86 disposed within aperture 85 for aligning rod 82 to frame assembly 71. Rod 82 is capable of moving within aperture 85 and guide 86. For receiving the end of rod 82, frame assembly 71 further includes an alignment member 78 attached to weight 72 and having a recess 79 positioned in cooperative relationship with rod 82. When extended, rod 82 fits into recess 79 and pushes against alignment member 78, and in turn frame assembly 71, as is shown in FIG. 7. Frame assembly 71, thus, retracts clamp mechanism 30 away from support means 20.

Set Name side by side	Query	Hit Count	Set Name result set
	DB=USPT,PGPB,JPAB,EPAB,DWPI,TDBD; PLUR=YES; OP=ADJ		
L20	L17 and align$	12	L20
L19	L15 same align$	27	L19
L18	L17 same align$	3	L18
L17	L15 same ((wafer or substrate) with (clean$ or remov$))	28	L17
L16	L15 same ((wafer or substrate) with clean$)	20	L16
L15	(chamber or apparat$) same (cluster$ with load lock)	152	L15
L14	(chamber or apparat$) same(cluster$ with load lock with align$)	1	L14
L13	(proces$ with (cluster with load lock with align$))	3	L13
L12	(substarte or semiconductor) same (proces$ with (cluster with load lock with align))	0	L12
L11	(substarte or semiconductor) same (cluster with load lock with align)	0	L11
L10	L6 same (cluster with load lock with align)	0	L10
L9	L8 same (cluster with load lock with align)	0	L9
L8	L6 same (proces$ with (deposit$ or pattern$ or plasma))	241	L8
L7	L6 and l3	11	L7
L6	((wafer or substrate) with (backside or back side or opposit$ side)) same ((clean$ or remov$) with (resid$ or partic$ or dust$ or deposit$ or contaminant$))	959	L6
L5	l1 same ((chuck or holder or piedestal) with gap)	1	L5
L4	L3 and l1	3	L4
L3	((134/26)!.CCLS.)	1045	L3
L2	L1 with (proces$ or produc$)	53	L2
L1	(wafer or substrate) with (backside or back side) with ((clean$ or remov$) adj5 (resid$ or partic$ or dust$ or deposit$ or contaminant$))	156	L1

END OF SEARCH HISTORY